ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 51

[OAR-2003-0032; FRL-]

Interim Guidance on Control of Volatile Organic Compounds in Ozone State Implementation Plans

AGENCY: Environmental Protection Agency (EPA).

ACTION: Notice of Interim Guidance on SIP Development

SUMMARY: The Environmental Protection Agency (EPA) encourages States to consider recent scientific information on the photochemical reactivity of volatile organic compounds (VOC) in the development of state implementation plans (SIPs) designed to meet the national ambient air quality standard (NAAQS) for ozone. This interim guidance summarizes recent scientific findings, provides examples of innovative applications of reactivity information in the development of VOC control measures, and clarifies the relationship between innovative reactivity-based policies and EPA's current definition of VOC at 40 CFR 51.100(s). This interim guidance does not change any existing rules.

ADDRESSES: EPA has established a docket for this action under Docket ID No. OAR-2003-0032. All documents in the docket are listed in the EDOCKET index at http://www.epa.gov/edocket. Although listed in the index, some information may not be publicly available, i.e., Confidential Business Information (CBI) or other information whose disclosure is restricted by statute. Certain other material, such as copyrighted material, is not placed on the Internet and will be publicly available only in hard copy form. Publicly available docket materials are available either electronically in EDOCKET or in hard copy at the Docket ID No. OAR-2003-0032, EPA/DC, EPA West, Room B102, 1301 Constitution Ave., NW, Washington, DC. The Public Reading Room is open from 8:30 a.m. to 4:30 p.m., Monday through Friday, excluding legal holidays. The telephone number for the Public Reading Room is (202) 566-1744, and the telephone number for the Air Docket is (202) 566-1742.

DATES: This policy is effective on **[insert date of publication in the Federal Register]**.

FOR FURTHER INFORMATION CONTACT: William L. Johnson, Office of Air Quality Planning and Standards, Air Quality Strategies and Standards Division, Mail code C539-02, Research Triangle Park, NC 27711, telephone (919) 541-5245.; fax number: 919-541-0824; e-mail address: Johnson.WilliamL@epa.gov.

Outline

SUPPLEMENTARY INFORMATION:

I. General Information

Does this Action Apply to Me?

You may be an entity affected by this interim guidance if you are a state or local air pollution control agency that has, or is currently developing, an ozone SIP containing programs to control VOC emissions. Additionally, you may be impacted if you use or emit VOCs in commercial/industrial/manufacturing operations, as well as other consumer/commercial activities. If you have questions regarding the applicability of this action to a particular entity, consult the person listed in the preceding "FOR FURTHER INFORMATION CONTACT" section.

This action does not impose any new mandates on States or industry, but rather provides information about options for meeting Clean Air Act mandates that are likely to be more effective, and more cost-effective, than the measures currently employed in most parts of the country.

II. Introduction

Ground level ozone, one of the principal components of “smog,” is a serious air pollutant that harms human health and the environment. In April 2004, EPA designated 126 areas of the country as "nonattainment" for the 8-hour ozone national ambient air quality standards (NAAQS). States and tribes are currently revising State Implementation Plans (SIPs) in order to bring air quality into compliance with the 8-hour ozone standard. The Agency has proposed that these SIP revisions must be submitted to EPA by June 15, 2007. Certain areas will need to submit separate reasonably available control technology (RACT) SIP revisions. There is final action pending that the Agency anticipates will require these revisions to be submitted by September 15, 2006. Some of the areas designated as nonattainment under the 8-hour standard have persistent air quality problems and will need to employ as many cost-effective controls as possible to achieve the 8-hour ozone NAAQS as expeditiously as practicable but no later than by their attainment date.

The development of measures to reduce ozone concentrations is complicated by the fact that ozone is not directly emitted. It is formed in the air by chemical reactions of nitrogen oxides (NOx) and VOCs in the presence of heat and sunlight. Therefore, ozone SIPs must address emissions of these ozone precursors.

There are thousands of individual chemical species of VOCs that can react to form ozone. It is generally understood that not all VOCs contribute equally to ozone formation and accumulation. Some VOCs react slowly and changes in their emissions have limited effects on local or regional ozone pollution episodes. Some VOCs form ozone more quickly, or they may degrade through a series of reactions that generates more ozone than the reaction pathways of other VOCs. Others not only form ozone themselves, but also enhance ozone formation from other VOCs. The photochemical reactivity of a compound is a measure of its potential to form ozone. By distinguishing between more reactive and less reactive VOCs, it should be possible to decrease ozone concentrations further or more efficiently than by controlling all VOCs equally.

Discriminating between VOCs on the basis of their contributions to ozone formation, or reactivities, is not straightforward. Reactivity is not simply a property of the compound itself; it is a property of both the compound and the environment in which the compound is found. The absolute reactivity of a single compound varies with VOC-NOx ratios, meteorological conditions, the mix of other VOCs in the atmosphere, and the time interval of interest. On the other hand, there are several scientifically valid methods that can be used to develop reactivity “scales” or weighting approaches based on the relative reactivity of different VOCs, and there is a high correlation between these different methods.

The promise of a more efficient VOC control strategy has led the California Air Resources Board (CARB), EPA, and other organizations to invest in reactivity research. This research has produced improved methods for discriminating between VOCs on the basis of reactivity under a variety of conditions. Applying some of the lessons of this research, California and Texas have developed innovative regulations that use VOC reactivity information to improve the efficiency or effectiveness of VOC controls for specific source categories. As States develop their 8-hour ozone SIPs, EPA encourages them to consider how they may incorporate VOC reactivity information to make their future VOC control measures more effective and efficient.

III. Short History of VOC Reactivity Policy and Research

The issue of VOC reactivity was first recognized by EPA in its initial guidance to States on the preparation of ozone SIPs in 1971. In this initial guidance, EPA emphasized the need to reduce the total mass of organic emissions, but also noted that "substitution of one compound for another might be useful where it would result in a clearly evident decrease in reactivity and thus tend to reduce photochemical oxidant formation." EPA encouraged States to promulgate SIPs with organic emission control provisions similar to those outlined in Los Angeles District's Rule 66, which allowed many VOC species thought to have minimal adverse effects to be exempted from control.

The Rule 66 exempt status for many of these organic emission species was questioned a few years later when research results from field studies conducted between 1971-1974 revealed that pollutant transport conditions were capable of enhancing ozone formation such that these "exempt" compounds were now considered significant ozone producers. Thus, in 1977, the EPA issued the "Recommended Policy on Control of Volatile Organic Compounds," offering its own, much more limited list of "negligibly reactive" compounds to be exempted [42 FR 35314, July 8, 1977]. As new information about the reactivity of different compounds has become available, EPA has continued to add to the list of negligibly reactive compounds following the logic of the 1977 policy. In 1992, this list of negligibly reactive compounds was explicitly excluded from the definition of VOC when it was codified in 40 CFR 51.100(s) [57 FR 3941, February 3, 1992]. Since 1977, EPA has designated approximately 50 compounds or classes of compounds as negligibly reactive and has excluded these compounds from the regulatory definition of VOC.

Beginning in the early 1990s, CARB has pursued the development of regulatory approaches that more fully discriminate VOCs on the basis of reactivity. In 1991, CARB incorporated a reactivity scale for weighting the emissions of individual VOC species in their low emitting vehicle and clean fuels regulation. The scale was designed to account for the differences in the ozone-forming potential of exhausts from gasoline engines and alternative fueled vehicles. The scale adopted by CARB was the Maximum Incremental Reactivity (MIR) scale, derived using a series of box model simulations with varying VOC composition and VOC-NO_X ratios.[1] The MIR scale is commonly expressed in units of grams of ozone produced per gram of VOC emitted.

Over the course of the 1990s, CARB continued to invest in the development of reactivity scales and to explore their potential regulatory applications. In June 2000, CARB adopted an aerosol coatings regulation that incorporates an updated MIR scale. This regulation is described in

[1] Carter, William P. L. "Development of Ozone Reactivity Scales for Volatile Organic Compounds." *Journal of the Air and Waste Management Association* 44 (1994): 881-99.

more detail below. Currently, CARB is exploring the use of reactivity scales in other programs, including regulations for architectural coatings.

In 1998, EPA participated in the formation of the Reactivity Research Working Group (RRWG), which was organized to help develop an improved scientific basis for reactivity-related regulatory policies.[2] All interested parties were invited to participate. Since that time, representatives from EPA, CARB, Environment Canada, States, academia, and industry have met in public RRWG meetings to discuss and coordinate research that would support this goal. The RRWG has organized a series of research projects that have addressed issues such as:

- The sensitivity of ozone to VOC mass reductions and changes in VOC composition;
- The derivation and evaluation of reactivity scales using photochemical airshed models;
- The development of emissions inventory processing tools for exploring reactivity-based strategies; and
- The fate of VOC emissions and their availability for atmospheric reactions.

This research has led to a number of findings that increase our confidence in the ability to develop approaches that discriminate between VOCs on the basis of reactivity. These findings include:

- State of the art chamber studies at low VOC-NO_X ratios demonstrate that current atmospheric chemistry models generally perform as well under "real world" conditions as under the high concentration scenarios used in their development.[3]

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[2] See http://www.cgenv.com/Narsto/reactinfo.html

[3] Carter, William P. L., D.R. Crocker, III, D. R. Fitz, L.L. Malkina, K. Bumiller, C.G. Sauer, J.T. Pisano, C. Bufalino, and C. Song. "A New Environmental Chamber for Evaluation of Gas-Phase Chemical Mechanisms and Secondary Aerosol Formation." *Atmospheric Environment* accepted for publication, July 15, 2005 (in press).

- Substituting emissions of low reactivity compounds for emissions of high reactivity compounds can be effective in reducing 1-hour and 8-hour ozone concentrations. Substitutions based on equal mass, equal carbon, or equal molar concentrations will achieve different levels of ozone reduction depending on the chemicals being substituted. Similar to decreases in mass of VOC emissions, reactivity-based VOC substitution seems to reduce higher concentrations of ozone more than lower concentrations of ozone.[4]
- There are several scientifically valid methods that can be used to calculate reactivity scales, each with different strengths and weaknesses. Although there is a high correlation between the different methods (even the simplest ones), important differences exist in their geographical representativeness and in the amount of spread between low reactivity and high reactivity compounds.[5]
- Using available reactivity scales, it is possible to construct a VOC substitution scenario that will achieve approximately the same ozone reductions as reducing the overall mass of VOC emissions. However, when applied, the substitution scenario may increase ozone in some areas and decrease ozone in others depending on the robustness of the reactivity scale used.[6]
- Several reactivity metrics derived with airshed models (such as the Maximum Ozone Incremental Reactivity to Maximum Incremental Reactivity (MOIR-MIR) and Least

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[4] Arunachalam, S., R. Mathur, A. Holland, M.R. Lee, D. Olerud, and H. Jeffries. "Investigation of Voc Reactivity Assessment with Comprehensive Air Quality Modeling." Report to the U.S. Environmental Protection Agency, 2003; and Carter, William P. L., Gail S. Tonnesen, and G. Yarwood. "Investigation of Voc Reactivity Effects Using Existing Regional Air Quality Models." Report to the American Chemistry Council, Contract SC-20.0-UCR-VOC-RRWG, 2003.

[5] Carter, William P. L., Gail S. Tonnesen, and G. Yarwood. "Investigation of Voc Reactivity Effects Using Existing Regional Air Quality Models." Report to the American Chemistry Council, Contract SC-20.0-UCR-VOC-RRWG, 2003.

[6] *Ibid*

Squares Relative Reactivity (LS-RR)) appear to be robust over different regions of the country, meteorological episodes, year of analysis, averaging times, and models.[7]

EPA encourages all interested parties to continue working through the RRWG to improve the scientific foundation of VOC reactivity-based regulations. EPA will continue to update its guidance to States as new information becomes available. In the meantime, EPA encourages States to take advantage of the information that is now available in designing future VOC control strategies.

IV. Use of VOC Reactivity in Developing SIPs

Although the traditional approach to VOC control focused on reducing the overall mass of emissions may be adequate in some areas of the country, an approach that discriminates between VOCs based on reactivity is likely to be more effective and efficient. In particular, reactivity-based approaches are likely to be important in areas for which VOC control is a key strategy for reducing ozone concentrations. Such areas include:

- Areas with persistent ozone nonattainment problems
- Urbanized or other NO_X-rich areas where ozone formation is particularly sensitive to changes in VOC emissions
- Areas that have already implemented VOC RACT measures and need additional VOC emission reductions

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[7] Hakami, A., M.S. Bergin, and A.G. Russell. "Ozone Formation Potential of Organic Compounds in the Eastern United States: A Comparison of Episodes, Inventories, and Domains." *Environmental Science and Technology* 38 (2004): 6748-59; Hakami, A., M. Arhami, and A.G. Russell. "Further Analysis of Voc Reactivity Metrics and Scales." Report to the U.S. Environmental Protection Agency, 2004; and Derwent, R.G. "Evaluation and Characterization of Reactivity Metrics." Report to the U.S. Environmental Protection Agency, 2004.

In these areas, there are a variety of ways of addressing VOC reactivity in the SIP development process, including:

- *Developing accurate, speciated VOC emissions inventories.* EPA encourages States – and particularly States with persistent ozone problems – to develop emissions inventories that include emission estimates for individual VOC species, as opposed to only estimating total VOC mass. This type of information may be especially useful for identifying emissions of the most reactive VOCs in the most VOC-sensitive areas. Currently, most States collect information on the mass of total VOC emissions. For air quality modeling purposes, this mass is apportioned to individual chemical species using EPA-provided profiles for each source category. Many industries, however, calculate their reported total VOC emissions from detailed speciated information that they routinely gather for other reasons. Where appropriate, States may want to gather such detailed speciated information and compare it to the national default speciation profiles.

  States should also consider emerging research on the actual availability of VOCs for atmospheric reaction. In estimating VOC emissions, especially from coatings, solvents, and consumer products, it is often assumed that the entire volatile fraction is emitted and available for photochemical reaction, unless captured by specific control equipment. In some situations, however, otherwise volatile compounds may be trapped in liquid or solid phases or adhere to surfaces such that they are not actually released to the atmosphere. Once emitted into the atmosphere, VOCs may also be scavenged by rain, form particles, or deposit on surfaces.[8] Taking this behavior into account should lead to more accurate VOC

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[8] Reactivity Research Working Group. "Final Proceedings of Workshop on Combining Environmental Fate and Air Quality Modeling." Research Triangle Park, NC, 2000.

emissions inventories and photochemical modeling. It may also allow States to consider volatility thresholds or other approaches designed to reflect atmospheric availability in certain types of regulatory programs.

- *Prioritizing control measures using reactivity metrics.* Most States prioritize control measures for implementation based on the cost effectiveness of controlling the total mass of VOCs (i.e., $/ton). Using reactivity metrics and speciated VOC emission information, it is possible to calculate cost effectiveness on the basis of relative ozone formation (i.e., $/ozone decreased). By controlling the most reactive source categories first, a state may be able to decrease the total cost of reaching attainment. For example, Russell, et al.[9] found that in Los Angles, selecting VOC controls on the basis of reactivity would decrease the cost of achieving any given level of ozone reduction as compared to a mass-based strategy up to a certain level of reduction. As more controls are required, the cost of strategies optimized on a reactivity basis converge with the cost of mass-based strategies as all the available controls are applied in both cases.
- *Targeting emissions of highly-reactive VOC compounds with specific control measures.* With speciated emissions information, a state may develop control measures that specifically target sources of the most highly reactive VOCs. In the Houston-Galveston area, a comprehensive field study revealed that fugitive or episodic releases of several highly reactive compounds (e.g., ethylene, propylene, 1,3-butadiene, and butenes) from petroleum refining and petrochemical facilities have contributed significantly to exceedances of the ozone NAAQS. In 2002, after consultation with the local industry, the Texas Commission

[9] Russell, A.G., J.B. Milford, M.S. Bergin, S. McBride, L. McNair, Y. Yang, W.R. Stockwell, and B. Croes. "Urban Ozone Control and Atmospheric Reactivity of Organic Gases." *Science* 269 (1995): 491-95.

on Environmental Quality (TCEQ) issued rules targeting emissions of these highly reactive VOCs from four processes: fugitive releases, flares, process vents, and cooling towers. These first rules emphasized additional monitoring, record keeping, and enforcement rather than establishing individual unit emission limits. In 2004, TCEQ adopted a cap-and-trade program for ethylene and propylene emissions from flares, vents, and cooling towers in Houston. Under this program, each site is assigned a daily and yearly emissions cap. Non-highly reactive VOC emissions may be used to offset highly reactive VOC emissions up to a limit of 5% of the facility's initial cap. The non-highly reactive VOC emission offsets are discounted based on the ratio of the reactivity of the offsets to the reactivity of propylene. EPA has proposed approval of some facets of the Texas rules for the control and monitoring of highly reactive VOCs [70 FR 17640], and the Agency expects to propose action on other program elements, such as the cap-and-trade program, in the near future. Although EPA has not completed its review of the SIP revisions provided by Texas for the Houston-Galveston area, it does seem clear that targeting these highly reactive compounds for additional control will achieve substantial ozone benefit and is more cost effective than a rule targeting all VOCs.

- *Encouraging VOC substitution and composition changes using reactivity-weighted emission limits.* For some VOC source categories, such as paints, coatings, adhesives, and other formulated products, manufacturers may have the flexibility to change product formulations so as to change the composition as well as the mass of the VOC emissions. In some cases, changing the composition of the VOC emissions may be less costly and allow for better product performance than decreasing the mass of VOC emissions, while also providing greater benefits for ozone control. In 2000, CARB found that manufacturers were having difficulty meeting California's stringent mass-based VOC emission limits for aerosol coatings.[10] After extensive study and consultations with stakeholders, CARB replaced the mass-based emission limits for aerosol coatings with reactivity-weighted emissions limits, using a version of the MIR scale. CARB gathered VOC composition and sales information from manufacturers to create VOC emission profiles for different categories of aerosol coatings products. Using this composition information, CARB calculated the MIR-weighted emission limits that would achieve the same ozone reduction as would have been achieved by the existing mass-based emission limits. To determine compliance with the reactivity-weighted limits, the weight percent of each individual VOC in the product is multiplied by its corresponding MIR value and then summed for all VOCs in the product. All VOCs with MIR values, including those that are considered "negligibly reactive" under the national policy, are included in the calculation. For complex mixtures, such as mineral spirits, CARB performed analyses to assign appropriate MIR values for different mixtures. CARB intends to review and, as appropriate, update the reactivity scale used in the rule to incorporate the latest scientific information. EPA has proposed approval of this rule for inclusion in California's SIP [70 FR 1640, January 7, 2005] and expects to finalize this approval in the near future. EPA and CARB view this rule as an important opportunity to gather additional information about the effectiveness and practical implementation issues associated with a reactivity-based program.

[10] California Air Resources Board. "Initial Statement of Reasons for the Proposed Amendments to the Regulation for Reducing Volatile Organic Compound Emissions from Aerosol Coating Products." 2000.

V. Relationship to Existing VOC Exemption Policy

Although a continuous reactivity scale is likely to be the most effective approach for regulating VOCs in many areas of the country, such an approach is more difficult to develop and implement than traditional mass-based approaches because reactivity-based programs carry the extra burden of characterizing and tracking the full chemical composition of VOC emissions. In addition, although most existing VOC control programs do not discriminate between individual VOCs based on reactivity, they continue to provide significant ozone reduction benefits and will remain in place unless and until they are replaced by programs that achieve the same or greater benefits.

Under virtually all existing programs, EPA and States exclude certain negligibly reactive compounds from the regulatory definition of VOC and thus exempt them from regulation as ozone precursors. This exemption policy serves two important purposes:

1) Because EPA does not give VOC reduction credit for programs that reduce emissions of negligibly reactive compounds, control efforts are focused on emissions that contribute significantly to the formation and accumulation of ozone. The Agency continues to believe that it is not appropriate, and would be misleading, to give VOC reduction credit to States or industries for reducing emissions of compounds that have little or no effect on ozone concentrations.
2) Because negligibly reactive compounds are not subject to regulation as VOCs, industry has an incentive to use negligibly reactive compounds in place of higher reactivity compounds. The exemption approach also creates a strong incentive for industry to invest in the

development of negligibly reactive compounds and low reactivity formulations. The Agency continues to believe that the substitution of "VOC-exempt" compounds for regulated VOCs is an effective ozone control strategy, even though it is not as effective or efficient as the use of a continuous reactivity scale to encourage optimal substitutions in terms of ozone control.

Because the current exemption approach continues to serve these purposes, EPA will continue its efforts to identify negligibly reactive compounds and exclude them from the federal regulatory definition of VOC. The Agency expects that such compounds will also be exempt from state VOC control programs, with exceptions made for specific reactivity-based rules such as the CARB aerosol coatings rule.

Since 1977, EPA has used the reactivity of ethane as the threshold of negligible reactivity. Compounds that are less reactive than or equally reactive to ethane have been deemed negligibly reactive. Compounds that are more reactive than ethane continue to be considered reactive VOCs and subject to control requirements. The selection of ethane is based on a series of smog-chamber experiments that underlies the 1977 policy. In these experiments, various compounds were injected into a smog chamber at a molar concentration that was typical of the total molar concentration of VOCs in Los Angeles ambient air at the time (4 ppmv). NO_X was injected into the chamber at a concentration of 0.2 ppm, and as the chamber was exposed to sunlight, the maximum ozone formed in the chamber was measured. The maximum ozone formed in the chamber was compared to the level of the NAAQS, which at the time was 0.08 ppm of oxidants. Propane was the most reactive compound tested that did not cause a maximum ozone concentration greater than 0.08 ppm. Ethane was somewhat less reactive than propane. Based on these experiments, the Agency determined that ethane should be used as the benchmark for identifying compounds whose potential contribution to ozone formation was below regulatory concern.

A more recent modeling study conducted under the auspices of the RRWG replicated the essence of the 1970s smog chamber experiments using a state-of-the-art airshed model of the eastern United States. In this study, Carter et al. replaced all anthropogenic VOC emissions with ethane and found that ozone formation decreased almost as much as when all anthropogenic emissions of VOC were removed. When anthropogenic emissions were removed or when they were replaced with ethane, the model still predicted ozone concentrations greater than the level of the NAAQS due to emissions of NO_X and biogenic VOCs.[11]

The metric used to compare the reactivity of a specific compound to that of ethane has varied over time. The primary metric for comparison has been k_{OH}, the molar rate constant for reactions between the subject compound and the hydroxyl radical (OH). In several cases, EPA has also looked at comparisons of MIR values expressed on both a molar and a mass basis. Comparing MIR values on a molar basis versus a mass basis can lead to different conclusions about whether a compound is less reactive or more reactive than ethane. In two cases, acetone [60 FR 31633, June 16, 1995] and tertiary butyl acetate [69 FR 69293, November 29, 2004], EPA has exempted compounds based on the finding that the compounds are less reactive than ethane when compared using incremental reactivity values expressed on a mass basis, even though they were more reactive on a molar basis.

The molar comparison is more consistent with the original smog chamber experiments, which compared equal molar concentrations of individual VOCs, that underlie the selection of

[11] Carter, William P. L., Gail S. Tonnesen, and G. Yarwood. "Investigation of Voc Reactivity Effects Using Existing Regional Air Quality Models." Report to the American Chemistry Council, Contract SC-20.0-UCR-VOC-RRWG, 2003.

ethane as the threshold. The mass-based comparison is consistent with how MIR values and other reactivity metrics are applied in reactivity-based emission limits. The mass-based comparison is slightly less restrictive than the molar-based comparison in that a few more compounds qualify as negligibly reactive.

Given the two goals of the exemption policy articulated above, the Agency believes that ethane continues to be an appropriate threshold for defining negligible reactivity. Furthermore, in light of the second goal of encouraging environmentally beneficial substitutions, EPA believes that a comparison to ethane on a mass basis strikes the right balance between a threshold that is low enough to capture compounds that significantly affect ozone concentrations and a threshold that is high enough to exempt some compounds that may usefully substitute for more highly reactive compounds.

When reviewing compounds that have been suggested for VOC-exempt status, EPA will continue to compare them to ethane using k_{OH} expressed on a molar basis and MIR values expressed on a mass basis. Consistent with past practice, the Agency will consider a compound to be negligibly reactive as long as it is equal to or less reactive than ethane based on either one of these metrics. The Agency will also consider other reactivity metrics that are provided with adequate technical justification, such as metrics based on airshed modeling. States may also wish to identify VOC exemptions in their SIPs in order to encourage VOC substitutions that would reduce ozone formation.

In the past, concerns have sometimes been raised about the potential impact of a VOC exemption on environmental endpoints other than ozone concentrations, including fine particle formation, air toxics exposures, stratospheric ozone depletion, and climate change. EPA has recognized, however, that there are existing regulatory and non-regulatory programs that are specifically designed to address these issues, and the Agency continues to believe that the impacts of VOC exemptions on environmental endpoints other than ozone formation will be adequately addressed by these programs. The VOC exemption policy is intended to facilitate attainment of the ozone NAAQS, and questions have been raised as to whether the Agency has authority to use its VOC policy to address concerns that are unrelated to ground-level ozone. Thus, in general, VOC exemption decisions will continue to be based solely on consideration of a compound's contribution to ozone formation. However, if the Agency determines that a particular VOC exemption is likely to result in a significant increase in the use of a compound and that the increased use would pose a significant risk to human health or the environment that would not be addressed adequately by existing programs or policies, EPA reserves the right to exercise its judgment in deciding whether to grant an exemption.

In all but one of the past exemption decisions, EPA has exempted negligibly reactive VOCs from record keeping and reporting requirements as well as control requirements. Concerns have been raised that even negligibly reactive compounds, if present in sufficient quantities, can contribute significantly to ozone formation over large spatial scales. Without record keeping and reporting requirements, States and EPA have no regular mechanism for maintaining adequate emissions inventories of negligibly reactive compounds or tracking their collective contribution to ozone concentrations. One approach for addressing this issue would be to require record keeping and reporting of all negligibly reactive VOC emissions. The Agency recognizes, however, that efforts to develop state and local inventories of such emissions are a relatively low priority compared to other activities that are likely to be more important for reducing ozone concentrations.

In particular, as noted above, efforts to develop speciated emissions inventories should be focused on highly reactive compounds because programs targeted at controlling emissions of these compounds are likely to be more effective than simply regulating all VOCs equally.

Another approach that would allow policymakers to track potential increases in emissions of negligibly reactive compounds would be to ask manufacturers who are responsible for VOC exemption petitions to provide EPA with periodic estimates of the magnitude and distribution of emissions of the exempted compound. Although such an approach would not provide detailed information about the location of such emissions, this type of spatial definition is relatively unimportant for compounds with negligible reactivity. The Agency believes that parties submitting VOC exemption requests may be able to provide emissions estimates that are sufficient for purposes of tracking the potential effects of VOC-exempt compound emissions on regional air quality. The Agency may consider such an approach in the future.

VI. Summary

EPA encourages States, and particularly those with persistent ozone nonattainment problems, to consider recent scientific information on VOC reactivity and how it may be incorporated into the development of ozone control measures. Using reactivity information, States may be able to improve the effectiveness and efficiency of their VOC control policies. EPA encourages all interested parties to continue to work through the RRWG to improve the scientific foundation for reactivity-based regulatory approaches. Although most existing VOC control programs do not discriminate between individual VOCs based on reactivity, they continue to provide significant ozone reduction benefits and will remain in place unless and until they are replaced by programs that achieve the same or greater benefits. Therefore EPA will continue its policy of granting VOC exemptions for compounds that are negligibly reactive. EPA will continue to evaluate new scientific information regarding VOC reactivity and will update this interim guidance as appropriate. This interim guidance does not change any existing rules.

List of Subjects in 40 CFR Part 51

Environmental protection, Administrative practice and procedure, Air pollution control, Intergovernmental relations, Nitrogen dioxide, Ozone, Particulate matter, Reporting and record keeping requirements, Volatile organic compounds.

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Dated:

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Jeffrey R. Holmstead

Assistant Administrator

for Air and Radiation